New products certificate by Chinese government
High and new technology products certificate by Chinese government
Patent for Invention in Europe (Patent No. 2412627)
Patent for Invention in the United States (Patent No. 9181109)
Patent for Invention in Japan (Patent No. 5780609)
Patent for Invention in Korea (Patent No. 10-0947558)
Patent for Invention in China (Patent No. 2010800041745)
EPT International invention patent (NO. : PCT / CN2010 / 07750)

BSKY

BSKY™

Ballast Water Management System

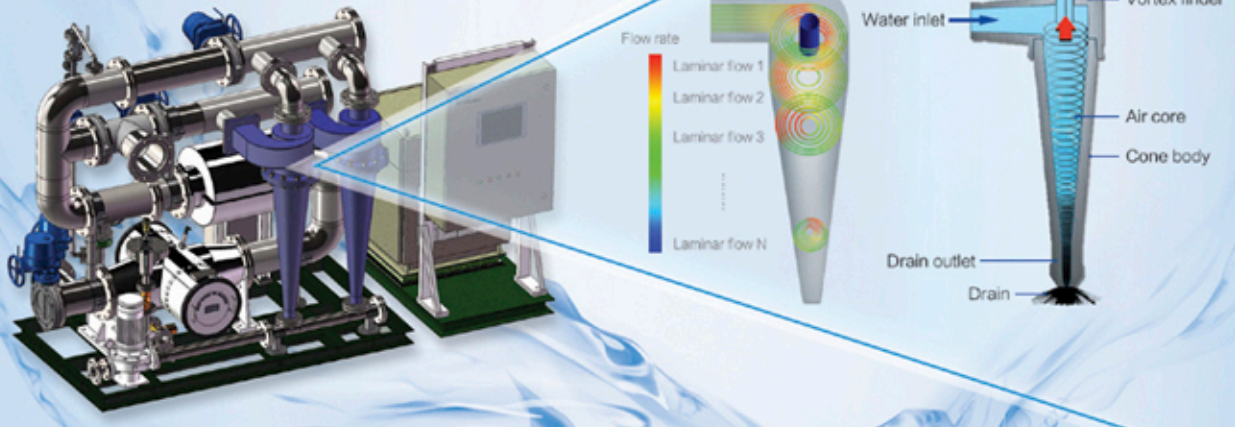
Enhanced Physical Treatmemt (EPT) Technology with No Clogging Separation Unit

Brightsky (BSKY) is the only one in the world creating high efficient Hydrocyclone for BWMS

- No Maintenance
- No Replacement
- No Clogging

High reliability

- No one think sieve type filter wouldn't be clogged
- Who can assure a life time of filter under stringent condition?



CCS DNV·GL Lloyd's Register BUREAU VERITAS ABS ClassNK KR

WUXI BRIGHTSKY ELECTRONIC CO.,LTD.

Through our deep understanding of buildings and marine fire protection and ballast water management system and our hard work, Brightsky Electronic has gained the Approval from authority bureaus. We will use our technical expertise to run our business in this area forever.

▼ R&D and Electronics Production Building: 36,000M²

Production area of BWMS: 23,778M²

Automatic machining and inspection facility support a high quality product

Automatic pipeline-flange welding system

Robot welding system

Shaped pipe cutting system

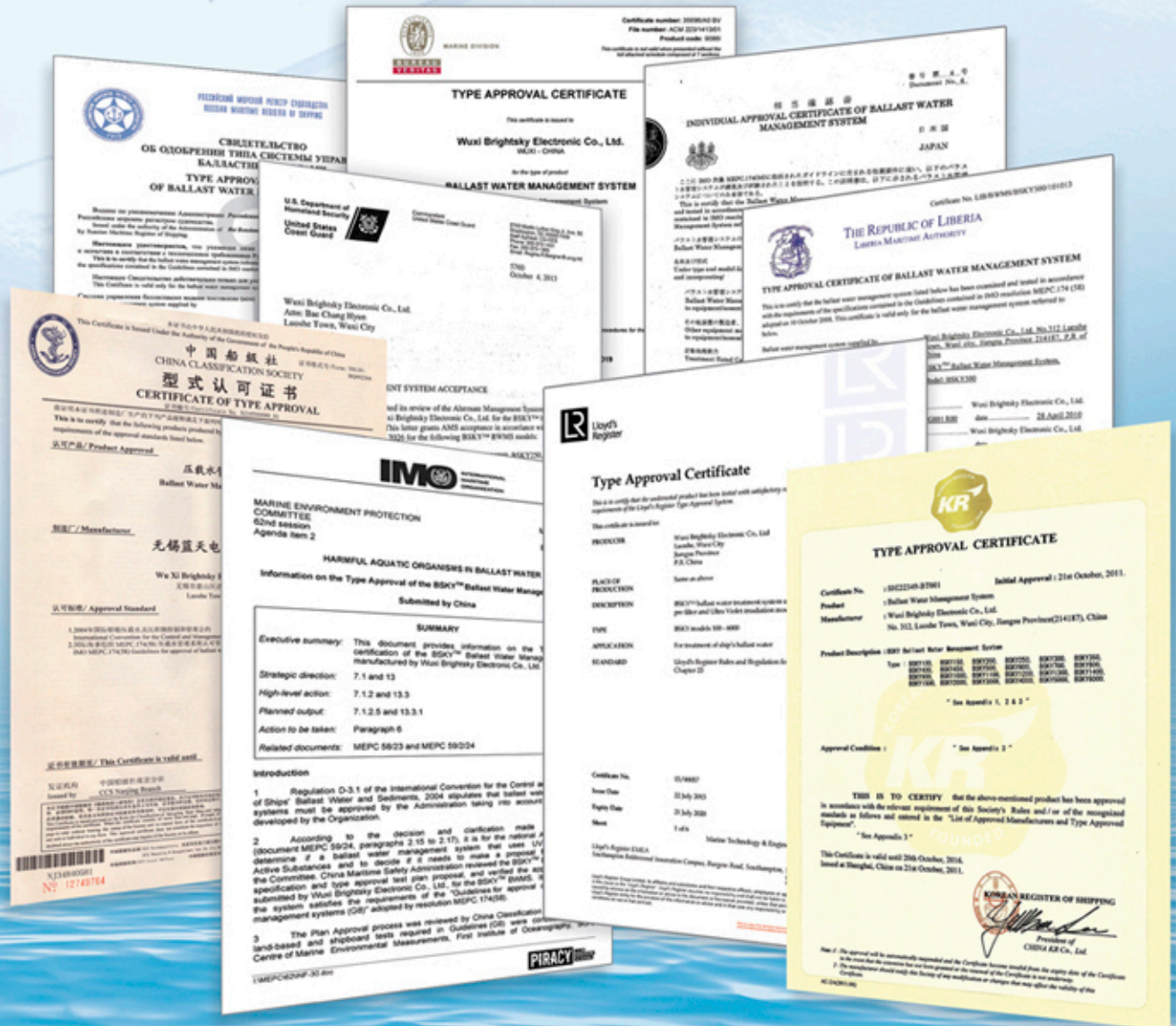
Vibration and impact test equipment

System Certification

- China Important New Products Certificate
- High-Tech Product Certificate
- Patent for Invention in Europe (Patent No. 2412627)
- Patent for Invention in the United States (Patent No. 9181109)
- Patent for Invention in Japan (Patent No. 5780609)
- Patent for Invention in Korea (Patent No. 10-0947558)
- Patent for Invention in China (Patent No. 2010800041745)
- EPT International invention patent (NO. : PCT / CN2010 / 07750)

System Certification

- China Government & CCS Type Approval
- LR Type Approval
- BV Type Approval
- RS Type Approval
- KR Type Approval
- Liberia Government Type Approval
- IMO Approval
- USCG (AMS) Approval
- JG Approval

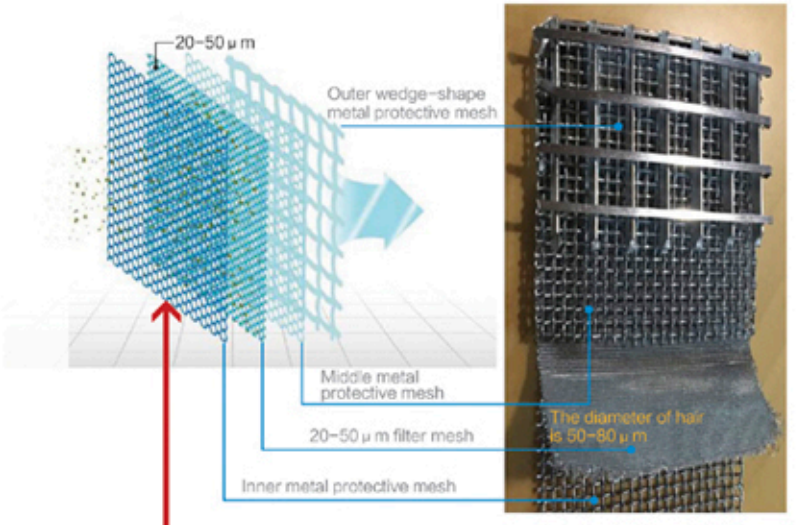


Pollution caused by discharge of ship's ballast water has been confirmed as one of the four major pollution sources to the world oceans. UV disinfection has become one of the most mature, reliable, effective pure physical methods for ship's ballast water disinfection.

For the ship's ballast water, this specific treatment object, BSKY expert designs enhanced physical technology (EPT) including hydrocyclone separation filter + ultrasonic wave pre-treatment + UV reactor disinfection, uses powerful function to rapidly treat ballast water, so as to complete the ballast and discharge during loading and unloading, the treated ballast water discharged following treatment completely meets the requirement of International Maritime Organization (IMO) and United States Coast Guard (USCG).

The biggest worry for ship owners — — Filter clogging problem

- The size of sieve in the filter of all ballast water treatment device is 20-50 μ m, less than the diameter of hair, therefore, the clogging problem is a trouble to all users.
- Filamentous, flocculent or trichosporon kinds marine microbe easily cling to a gap between protective mesh and filter screen, it causes terrible inconvenience during back flushing.
- In case ship's draft line is deep, a lot of mud and sand will be sucked from sea chest, it would clog the filter.
- This kind of a minute and fine filter brings big resistance to water flow, and it requires very high pressure to discharge water through the filter, which causes great pressure loss of ballast water pipe and great equipment pressure loss.

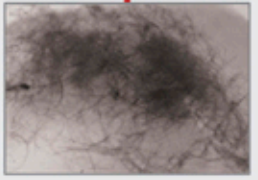


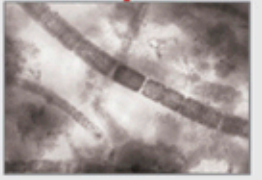
Stagnant water in the filter makes marine lives grow and adhere to the filter, a back flushing has no effect whatever at all.

Before cleaning

After cleaning

Filamentous or strip organisms hard to be cleaned become the main clogging source.

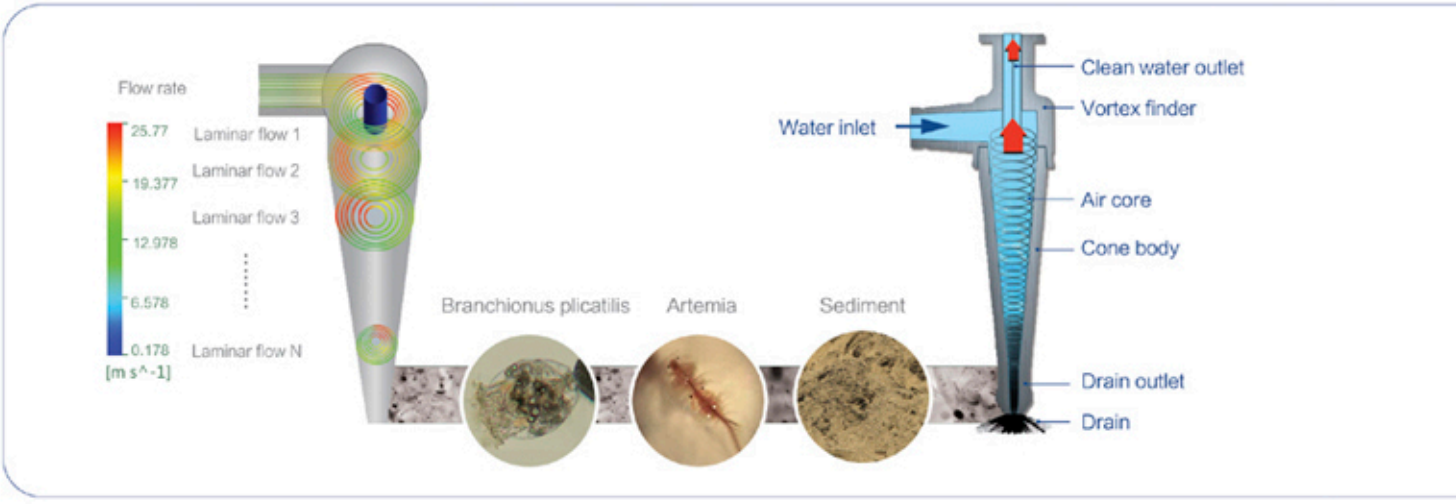




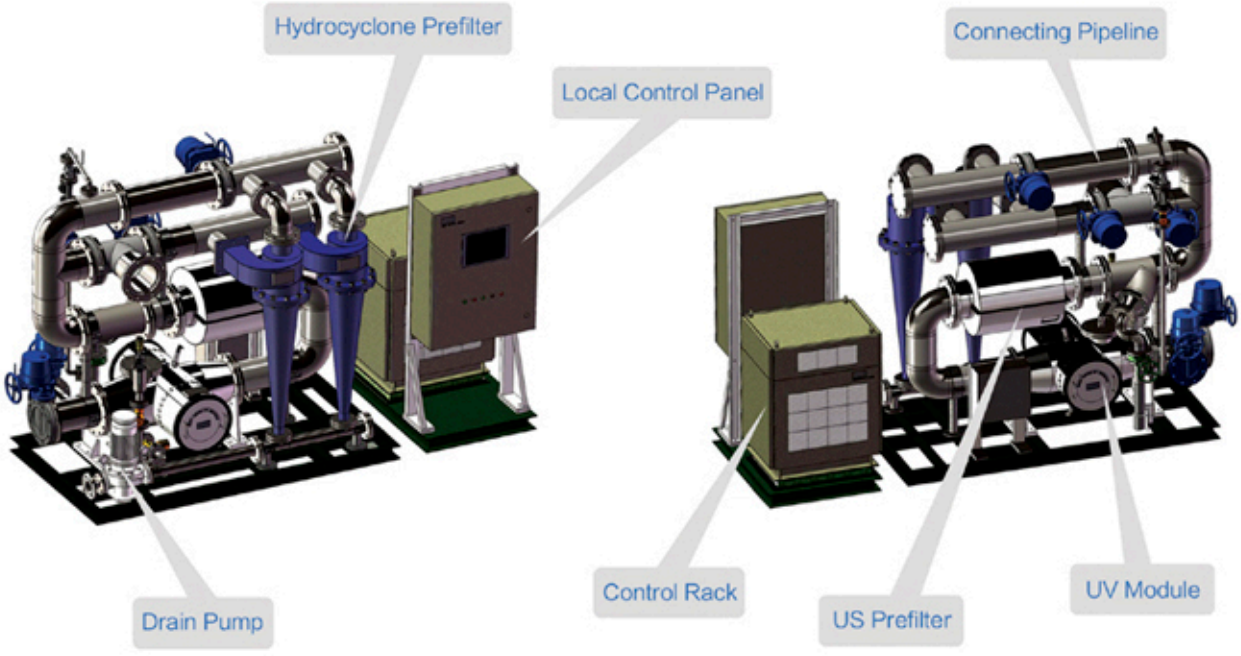
Manual cleaning scene after backwashing fails

Revolutionary breakthrough — —
Hydrocyclone technology replaces traditional filters

No mesh No maintenance part Simple expansion	Noiseless High-end duplex stainless steel Distributed installation	No moving parts No service time limit Can be tilted for no more than 45 degrees to install

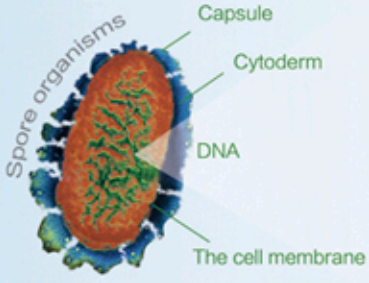


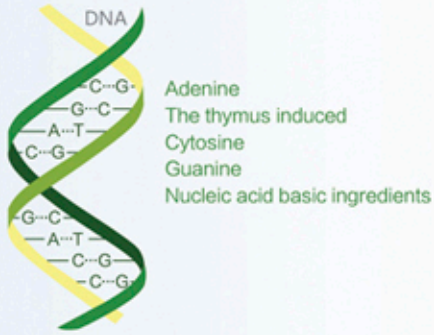
BSKY™ BWMS adopt the unique
'Enhanced Physical Treatment' technology



US — — Best companion with UV to sterilize

- System cleaning
- Particle degradation
- Purifying water quality
- Break biological cell walls



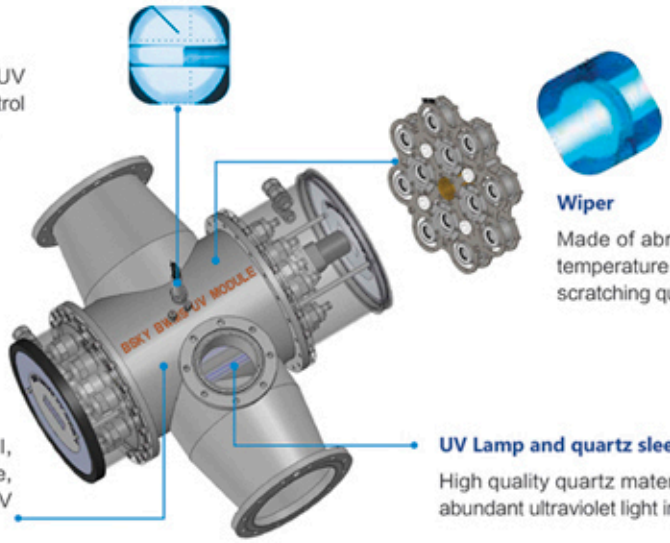


BSKY UV Module — — The real-time UV Dose tracing sterilization technology saves energy for you

- Medium pressure UV lamp has simple structure, wide range of radiation spectrum, and high energy intensity.
- Under the intelligent control of BSKY CON controller, BSKY UV Module can be ensured to work in the optimal state, which can save energy, prolong the service life of UV lamp, reduce operation cost and increase your investment return.
- Lamp quantity, UV dosage, operation time of lamp and system can be displayed to the operator, with function of UV output information, maintenance, warning and alarm.

UV sensor

Integrated and strictly calibrated UV sensor can realize continuous control of lamp according to water quality.



Wiper

Made of abrasion resistant and high temperature resistant material without scratching quartz sleeve.

UV reactor

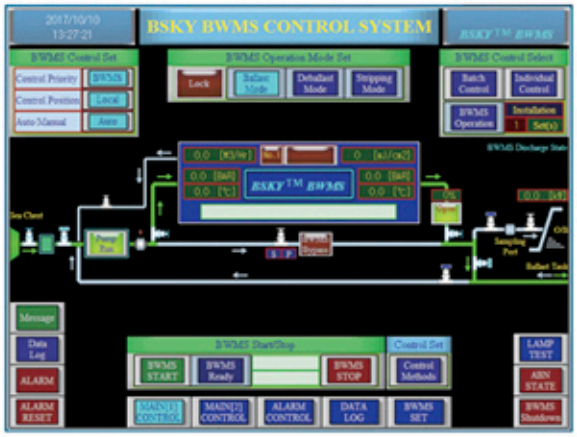
Made of duplex stainless steel, containing UV lamp, quartz sleeve, lamp wiper cleaning device, UV sensor and temperature sensor.

UV Lamp and quartz sleeve

High quality quartz material and transmit abundant ultraviolet light into the water.

BSKY_CON main controller

- One button start and stop
- Servo tracking of ballast pump
- Color LCD touch screen, integrated operation interface, Chinese, English, Japanese and Korean display.
- Instant responsive for maintenance
- Real-time prompt and storage of all information
- Operation data is automatically saved in USB for 5 years



BSKY_CON_R remote controller

- All functions are synchronized with BSKY_CON main controller
- Communicate with the host through network connection
- Control right is obtained from local according to the demand

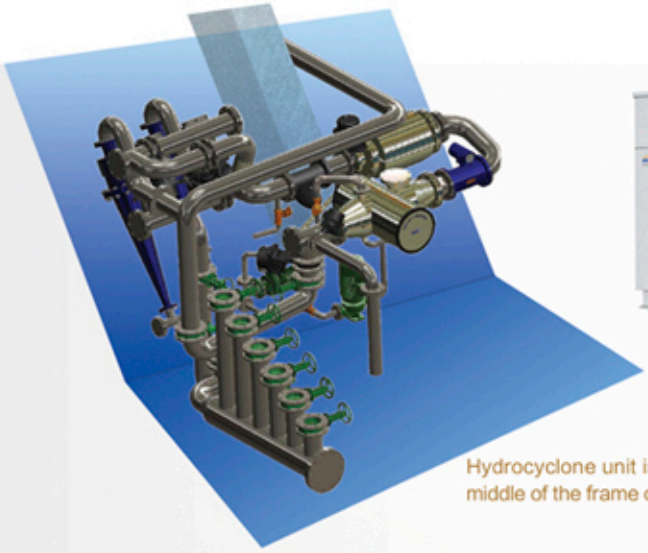
Distributed Installation Solution

When the engine room space cannot meet the requirement of integrated installation, distributed installation can be adopted, which makes full use of the limited space of the engine room, especially the hydrocyclone can be installed inclining the void space.

BSKY™ BWMS adopts modular structure with four major component :

① Hydrocyclone Unit
② Ultrasonic Unit
③ Ultraviolet Module
④ Control Rack and Control Panel

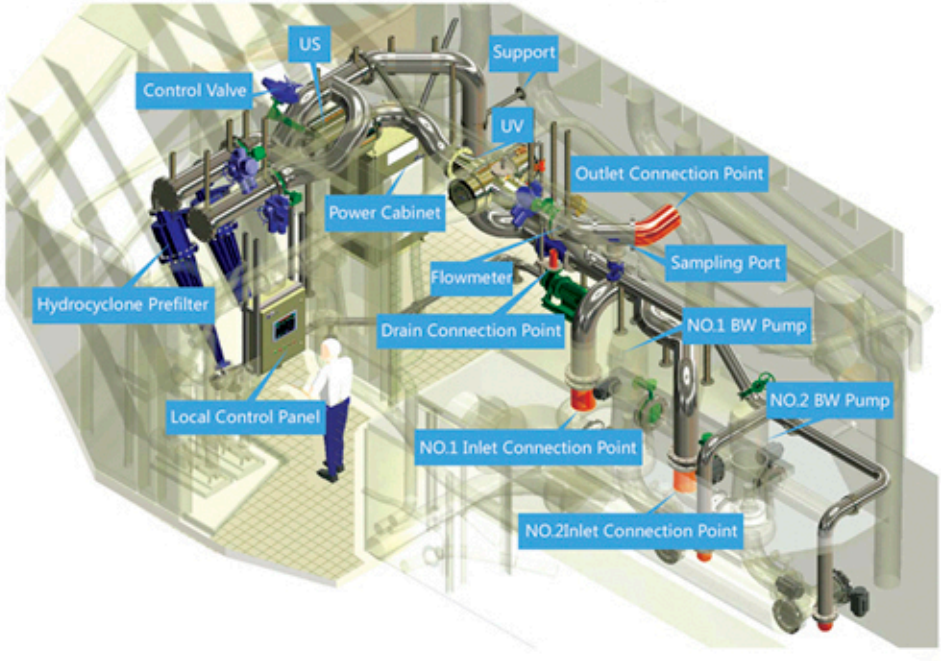
The four parts can be installed in one skid, or can be distributed and installed in the pipe line of ballast water management system. It is more flexible and can save more space for engine room or pump room.



Hydrocyclone unit is installed in middle of the frame of side plate.

Control rack including UV ballast & US generator and Local control panel are installed in engine room or E.C.R.

Remote control panel(optional) can be installed in B.C.R or C.C.R.



Best Installation Case of Retrofit Vessel.
Do not take possession of bottom space.

System specifications and configuration

Type	Flow rate [m/hr]	Hydrocyclone unit	US unit	UV module	System max. Power[kW]
BSKY100	100	CY10×1	US25	UV406	16.6
BSKY150	150	CY08×2 / CY12×1	US25	UV406	24.0
BSKY200	200	CY08×3 / CY10×2 / CY12×1	US25	UV406	31.7
BSKY250	250	CY08×4 / CY10×2	US25	UV406	38.9
BSKY300	300	CY08×4 / CY10×3 / CY12×2	US25 / US35	UV408	42.6
BSKY350	350	CY08×5 / CY10×3 / CY12×2	US35	UV412	50.5
BSKY400	400	CY08×5 / CY10×4 / CY12×2	US35	UV412	57.4
BSKY450	450	CY08×6 / CY10×4 / CY12×3	US35	UV412	64.9
BSKY500	500	CY08×7 / CY10×4 / CY12×3	US35	UV512	43.3
BSKY600	600	CY10×5 / CY12×3	US35 / US45	UV512	49.3
BSKY700	700	CY10×6 / CY12×4	US45	UV512	57.8
BSKY800	800	CY10×7 / CY12×4	US45	UV512	63.8
BSKY900	900	CY10×7 / CY12×5	US45 / US50	UV512	71.0
BSKY1000	1000	CY10×8 / CY12×5	US50	UV518	82.0
BSKY1100	1100	CY10×9 / CY12×6	US50	UV518	89.7
BSKY1200	1200	CY10×10 / CY12×6	US50	UV518	96.9
BSKY1300	1300	CY10×10 / CY12×7	US50	UV518	102.3
BSKY1400	1400	CY10×11 / CY12×7	US50	UV518	111.0
BSKY1500	1500	CY10×12 / CY12×8	US50	UV518	122.3

Additional explanation

1. The specification is for reference only and subject to change without notice.
2. For more configurations please refer to type approval certificate by Classification Society.

Project Service And Solution

01 Communication

- Vessel information
- Configuration
- Installation
- Onboard Inspection
- Technical agreement

02 Project Analysis

- Installation Period Analysis
- Cost Analysis

03 Project Design

- Drawing approved by Class
- Drawing approved by Owner / shipyard
- Production Drawing
- Working Drawing

Reverse engineering technology (3D Scanning) can improve the accuracy of locating also it has the advantage of saving the time and the waste of the pipes.

04 Manufacture

- Production Plan
- Purchasing Material
- BWMS Production
- Factory Acceptance test
- Delivery with owner / shipyard

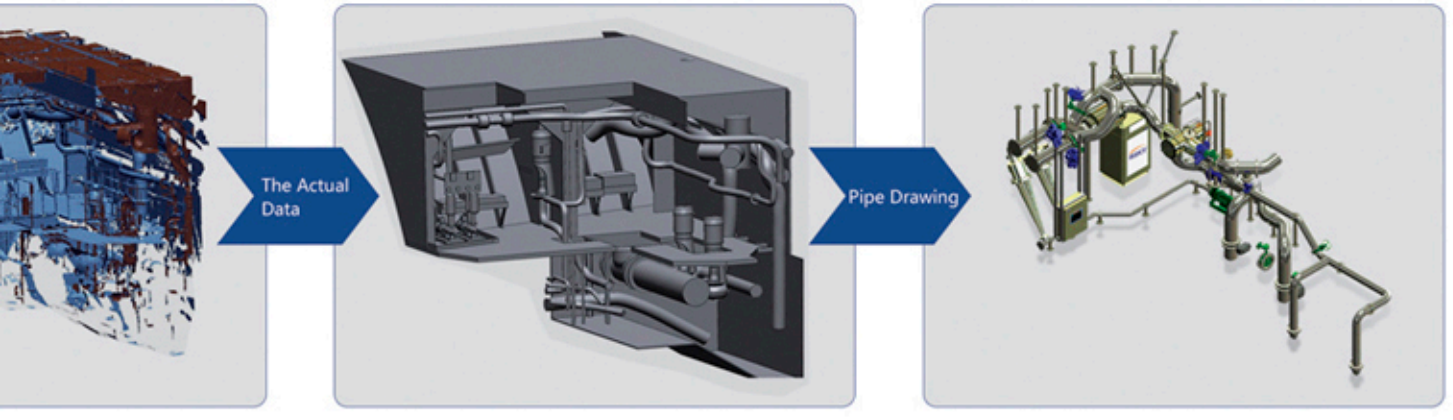
05 Installation

- Dry-docking
- Modify Ballast Pipe Line
- Install BWMS
- Trial Test
- Onboard Test with Class / Owner

06 Training & Service

- Ship Crew Training
- Normal Operation
- Regular Visiting

the parts and pre-fitting of pipes during the installation of BWMS for ships in service,

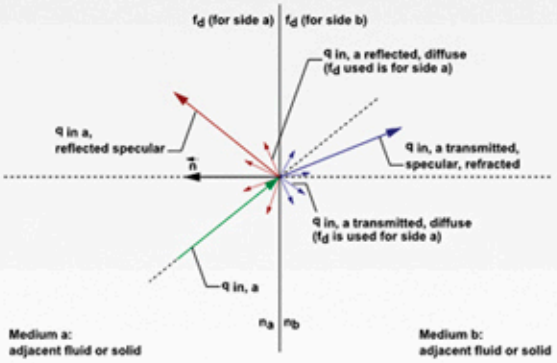


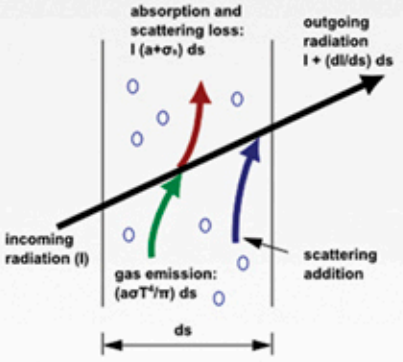
Updating and development

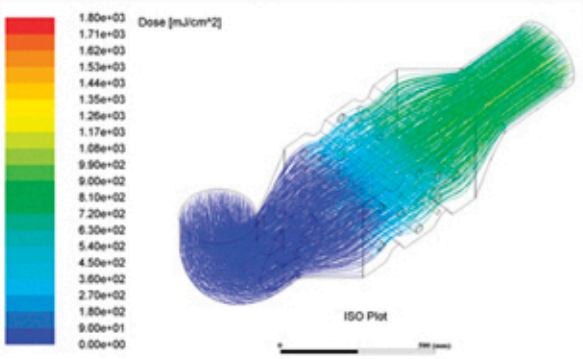
BSKY owns a batch of scientific research teams with international professional level on ballast water treatment device, system is designed through computer fluid dynamics (CFD) calculation and several biological ID test through computer simulation (liquid flow pattern, light distribution, etc.), many biological tests and verifications meet USCG test standard and IMO new G8 standard. Professional design of efficient UV disinfection and management systems, including UV power and control system.

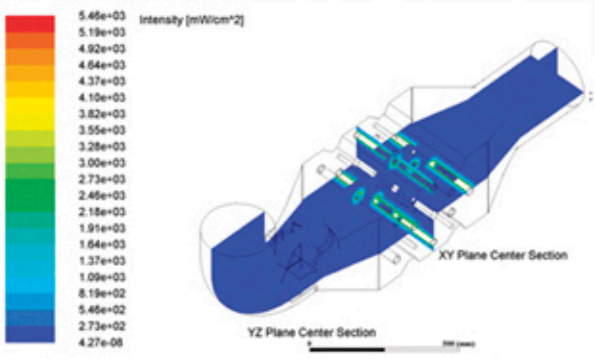
More advanced UV reactor design

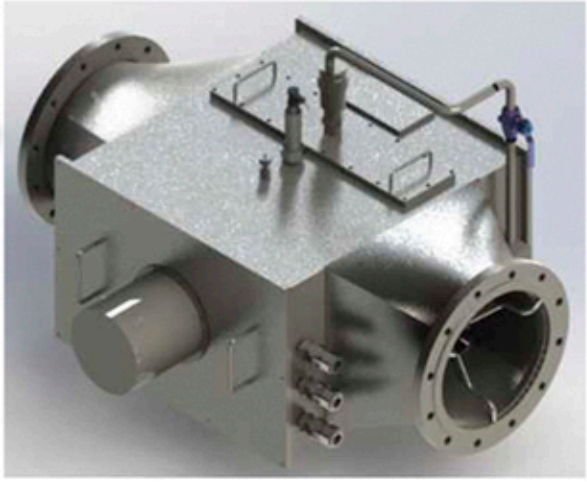
Through simulating every drop of water in UV reactor (take grid with diameter of 50um pixel) to obtain consistent UV radiation energy, our new generation UV reactor has the RED (Reduction Equivalent Dose) energy effect 1.45 times higher than the former UV reactor on UV energy utilization. At the same time, this reactor has passed USCG and IMO NEW G8 type test and obtained satisfactory result.



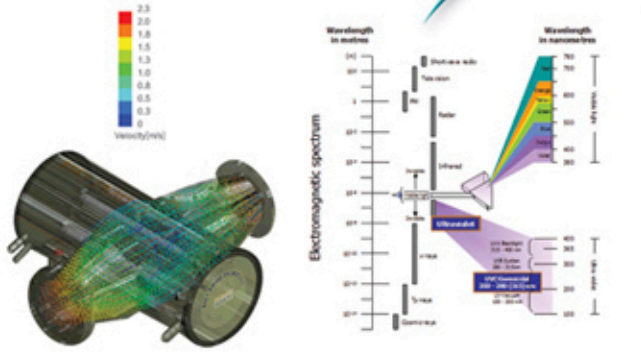








New generation UV Module



The old UV Module

USCG and IMO New G8 type Approval

BSKY has signed USCG type approval test contract with the independent laboratory KR designated by USCG, and conducted Land-based test on KOMERI platform in Korea.

Test Report

Korea Marine Equipment Research Institute
435, Haeyang-ro, Yeongdo-gu, Busan 49111, Rep. of KOREA
Tel +82-51-400-5000, Fax +82-51-400-5091

Report No. : KOMERI-0906-17T2480
http://www.komeri.re.kr

Korea Marine Equipment Research Institute

진 본
2017/09/27 14:42:09 KST

1. Applicant

- o Company Name : WUXI BRIGHTSKY ELECTRONIC CO., LTD.
- o Address : Luoshe Town, Wuxi City, Jiang-Su Province, P.R.China
- o Date of Receipt : 2017. 07. 26

2. Equipment under Test

- o Name of Product : Ballast Water Management System
- o Model : BSKY300
- o Serial No. : -

3. Test Standards : Refer to "1.2 TEST STANDARD"

4. Use of Report : Performance check

5. Test Period : 2017. 08. 18 ~ 2017. 08. 21

6. Environment : Temperature : (22.2 ± 4.1) ℃, Humidity : (61 ± 10) % R.H

7. Test Result : Refer to "1.6 TEST RESULT"

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

Affirmation	Tested by	Technical Manager
	Name : Hui-Jeong Kim (Signature)	Name : Jun-Hyuk Yang (Signature)

· The test results are valid only for the test sample(s) provided by the applicant, and cannot be reproduced in full or in part without the prior written consent of the KOMERI.

Date of issue : 2017. 09. 27

The President of Korea Marine Equipment Research Institute (Signature)

G4B(www.g4b.go.kr)진위확인코드 : rqczCWzL/kl=

Korea Marine Equipment Research Institute
435, Haeyang-ro, Yeongdo-gu, Busan 49111, Rep. of KOREA
Tel +82-51-400-5000, Fax +82-51-400-5091

1.6.2 de-Ballasting mode (2017. 08. 21)

(1) Water parameter in the discharge treated

Temp. (℃)	pH	Salinity (PSU)	D
28.82 ± 0.10	6.93 ± 0.01	28.83 ± 0.03	4.7

* Data indicates an arithmetic mean from each three replicates at the beginning, mid

TSS (mg/L)	DOC (mg/L)	POC (mg/L)	DO
37.5 ± 6.51	14.4 ± 0.18	1.19 ± 0.43	14

* Data indicates an arithmetic mean from each three replicates at the beginning, mid

(2) Living organisms in the discharge treated

Organisms ≥ 50 μm[1] (inds./m³)	≥ 10 μm and < 50 μm organisms[1] (inds./mL)	
	IMO	USCG
0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0

[1] Data indicates an arithmetic mean from assumes the entire volum is concentrated.
[2] Data indicates an arithmetic mean from each replicates at the beginning, middle, an

Coliform (CFUs/100 mL)	*Escherichia coli* (CFUs/100 mL)	
17 ± 10	1 ± 1	

* Data indicates an arithmetic mean from each replicates at the beginning, middle, en
[1] Not Detected.

G4B

The designated by USCG FDA/CMFDA analysis method is adopted and all test procedure meets the requirement of Environmental Technology Verification (ETV) protocol of United States Envionmental Protection Agency (EPA) and IMO new G8.

water

O (mg/L)	Turbidity (NTU)	Transmittance (%)
72 ± 0.05	11.9 ± 0.39	64.2 ± 0.22

dle, and end samples (Average ± Standard deviation)

M (mg/L)	POM (mg/L)	MM (mg/L)
.4 ± 0.18	5.82 ± 0.43	31.7 ± 6.73

dle, and end samples (Average ± Standard deviation)

water

Heterotrophic bacteria (CFUs/mL)[2]	
Salt modified R2A	Marine agar
2 000 ± 1 430	2 000 ± 1 670

o subsamples are analyzed (Average ± Standard deviation)
d end samples (Average ± Standard deviation)

Enterococci (CFUs/100 mL)	Toxigenic *Vibrio cholerae* (O1, O139) (CFUs/100 mL)
0 ± 0	N.D.[1]

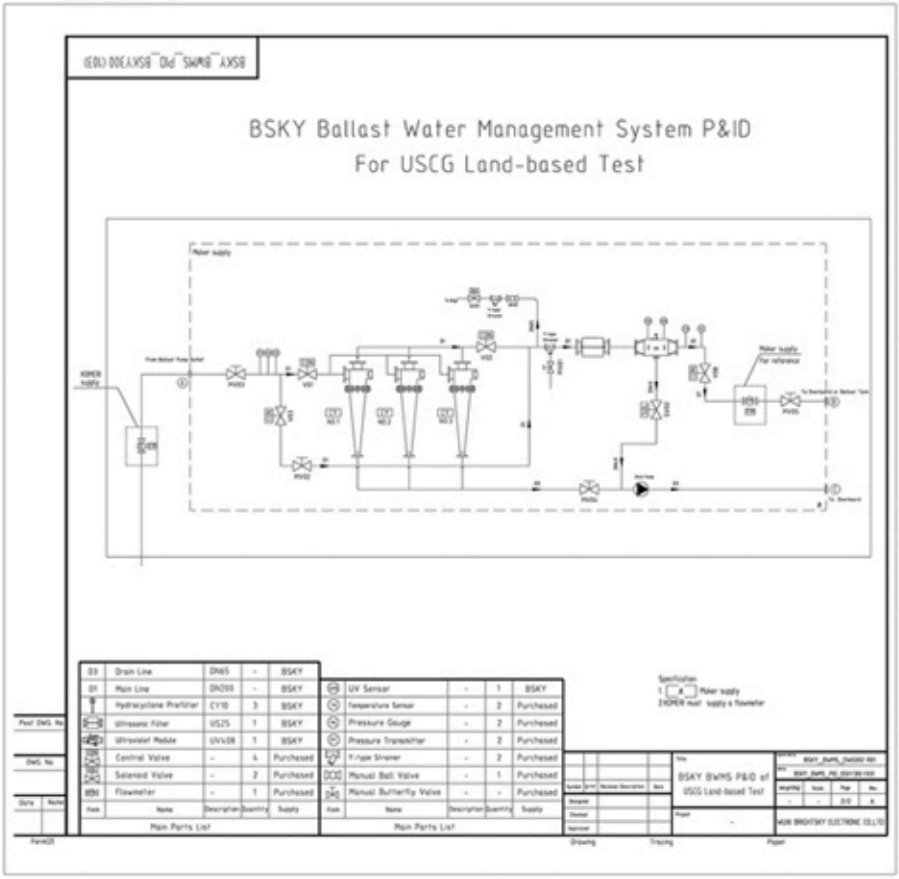
d end samples (Average ± Standard deviation)

-The end-

(www.g4b.go.kr)진위확인코드 : rqczCWzL/kl=

ATTACHMENT

I. DRAWING

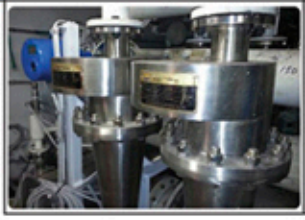


BSKY™ BWMS have been installed on vessels around the world, 142 vessels are Chinese owner,32 vessels are Japan, 30
Total reference is 254 vessels and 177 vessels are to new vessel, 77 vessels are to retrofit vessel.

Installation Reference (New vessel 177)

Ship Owner	China	Malaysia	Singapore
Ship Type	Bulk Carrier	7K PC	LPG Carrier
Pump Capa.	1000m³ / h x 2	200m³ / h x 2 100m³ / h x 2	300m³ / h x 2
Model	BSKY1000x2 set Skid Type	BSKY400EX x 1 BSKY100 x 1	BSKY300 x 1 set Skid Type
Installation Location	Engine Room	Pump Room Engine Room	Engine Room
Shipyard	China	China	Japan
Class	DNV	ABS	BV

Ship Owner	Korea	Japan	Singapore
Ship Type	Container	Cement Carrier	LPG Carrier
Pump Capa.	300m³ / h x 2	200m³ / h x 2	300m³ / h x 2
Model	BSKY300 x 1 set Semi Skid Type	BSKY 400 x 1 set Skid Type	BSKY300x1 set Skid Type
Installation Location	Engine Room	Engine Room	Engine Room
Shipyard	Korea	Japan	Japan
Class	KR	NK	BV

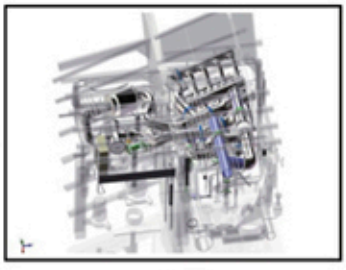


Ship Owner	Germany	Germany	Greece
Ship Type	Container	Bulk Carrier	LEG Carrier
Pump Capa.	500m³ / h x 2	700m³ / h x 2	150m³ / h x 2
Model	BSKY5000x1 set Skid Type	BSKY700x2set Skid Type	BSKY250x1 set Skid Type
Installation Location	Engine Room	Engine Room	Engine Room
Shipyard	China	China	Korea
Class	GL	LR	DNV

vessels are Germany, 26 vessels are Singapore, and 24 vessels are other countries.

Installation Reference (Retrofit vessel 77)

Before


After

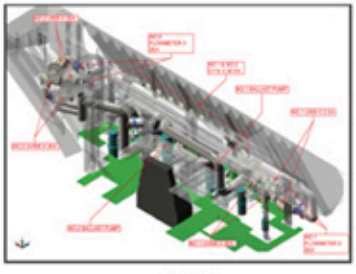
Ship Owner	MOL (Japan)
Ship Type	VLGC
Pump Capa.	750m³/ h x 2
Model	BSKY1500Ex × 1 set
Installation Location	Engine Room

Before

After

Ship Owner	Carl Buettner (Germany)
Ship Type	Chemical Tanker
Pump Capa.	450m³ / h x 2 (Framo)
Model	BSKY500Ex x 1 set
Installation Location	On Deck

Before


After

Ship Owner	DCKK (Japan)
Ship Type	95K Bulk Carrier
Pump Capa.	2000m³ / h x 2 (Framo)
Model	BSKY2000 x 2 set
Installation Location	Engine Room

Before

After

Ship Owner	CP Offen (Germany)
Ship Type	4100TEU Container
Pump Capa.	500m³ / h x 2 (Framo)
Model	BSKY500 x 1 set (Skid)
Installation Location	Engine Room

Global Service Network

Location	Company	PIC	TEL	E-mail
China	Guangzhou Shunhai life saving appliances Co., Ltd.	Mr.L.H.Chen	86 2062801063	shunhai@public.guangzhou.gd.cn
Japan	Nagasaki Marine Service Co., Ltd. KUNIMORI ENGINEERING WORKS CO., LTD. Unitra Maritime Co., Ltd	Mr. Nishimura Mr. Liu pingjian Mr. Shu Tsuyoshi	81 95 814 1263 81-3-3437-5022 81 3 35957671	nishimura@nmsco.co.jp liu@kunimori.co.jp shu@unitra.co.jp
Singapore	Bosung Engineering (Singapore) Ltd. SEADRAGON TECHNOLOGIES PTE LTD	Mr. Steve Ho Mr. Wilson Wang	65 9666 3188 65 6316 5830	steve.ho@gcd.com.sg wilson@sdtech.com.sg
India	NCGB Marine Private Limited	Mr. S. S. Bosse	91 22 6529 4618	ssbose@ncgb.co.in
OMAN	Tile Marine Oman	Mr. Michael Loh	968 2478 5818	omanops@tilemarine.com
Thailand	Asian Marine Services P.C. Ltd. JS Maritime	Mr. Jirapon Mr. Colin SEO	66 2-8152060 66 2 320 7702-4	mkd@asimar.com mail@jsmaritime.com
Greece	Bosung Engineering (Hellas) Ltd.	Mr. Nicklos Niarchos	30 210 4187010	bosung@hol.gr
Germany	Bosung Engineering Hamburg	Mr. Tim Kim	49 40 2385 7710	hamburg@bosung.com
Denmark	DME	Mr. Palle	45 78 78 92 43	pdk@dmeas.com
Finland	PACE1 Tools Ltd	Mr. Jukka Jokinen	358 207 871 730	jukka.jokinen@pace1tools.com
Netherland	STX Europe	Mr. Saverio Bae	31 88 451 2020	shbae@onestx.com
Turkey	CT Global Solution Partnership	Mr. B.Serdar Arduc	90 (212) 777 7241-42	serdar@marinect.com
USA	L.A. Maritime LA L.A. Maritime New York L.A. Maritime Huston	Mr. Dieter Liebich Mr. Tom Mr. Hans Haneveld	1 (310) 518 1718 1 310 518 1718 1 832 582 7547	dl@la-maritime.com info@la-maritime.com hh@gc-maritime.com
Canada	L.A. Maritime Vancouver	Mr. Pettzo	1 310 518 1718	info@la-maritime.com
Brazil	STX Brazil Ltda.	Mr. Mateo	55.21.2543.4447	ryan.jun@onestx.com

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